

## Features

- ❑ Transient protection for high-speed data lines
  - IEC 61000-4-2 (ESD) ±25kV (Air)
  - ±20kV (Contact)
  - IEC 61000-4-4 (EFT) 40A (5/50 ns)
  - Cable Discharge Event (CDE)
- ❑ Package optimized for high-speed lines
- ❑ Ultra-small package (1.0mm × 0.6mm × 0.4mm)
- ❑ Protects one data, control or power line
- ❑ Low capacitance: 0.5pF (Typical)
- ❑ Low leakage current: 0.1μA @ V<sub>RWM</sub> (Typical)
- ❑ Low clamping voltage
- ❑ Each I/O pin can withstand over 1000 ESD strikes for ±8kV contact discharge

## Description

TT0311TCX is an ultra low-capacitance Transient Voltage Suppressor (TVS) designed to provide electrostatic discharge (ESD) protection for high-speed data interfaces. With typical capacitance of 0.5pF, TT0311TC is designed to protect parasitic-sensitive systems against over-voltage and over-current transient events. It complies with IEC 61000-4-2 (ESD) (±10kV air, ±10kV contact discharge), IEC 61000-4-4 (electrical fast transient - EFT) (40A, 5/50 ns), very fast charged device model (CDM) ESD and cable discharge event (CDE), etc.

TT0311TC uses ultra-small SOD-923 package. Each TT0311TC device can protect one high-speed data line. It offers system designers flexibility to protect single data line where space is a premium concern. The combined features of low capacitance, ultra-small size and high ESD robustness make TT0311TC ideal for high-speed data port and high-frequency line (e.g., HDMI & antenna line) applications, such as cellular phones and HD visual devices.

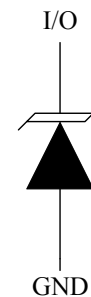
## Applications

- ❑ Serial ATA
- ❑ PCI Express
- ❑ Desktops, Servers and Notebooks
- ❑ Cellular Phones
- ❑ MDDI Ports
- ❑ USB2.0/3.0 Power and Data Line Protection
- ❑ Display Ports
- ❑ High Definition Multi-Media Interface (HDMI)
- ❑ Digital Visual Interfaces (DVI)

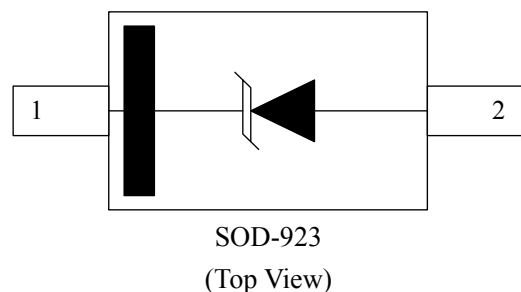
## Mechanical Characteristics

- ❑ SOD-923 package
- ❑ Flammability Rating: UL 94V-0
- ❑ Marking: Part number
- ❑ Packaging: Tape and Reel

## Circuit Diagram



## Pin Configuration



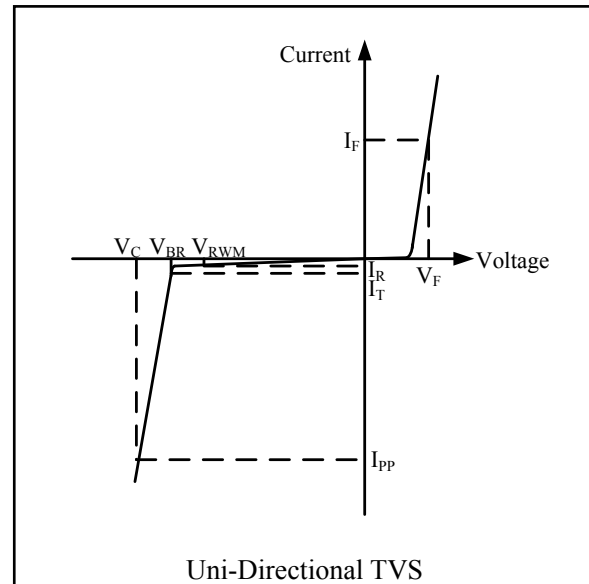


### Absolute Maximum Rating

Symbol	Parameter	Value	Units
$I_{PP}$	Peak Pulse Current( $t_p=8/20\mu s$ )(I/O pins)	5.0	A
$V_{ESD}$	ESD per IEC 61000-4-2 (Air) ESD per IEC 61000-4-2 (Contact)	$\pm 25$ $\pm 20$	kV
$T_{OPT}$	Operating Temperature	-55/+125	°C
$T_{STG}$	Storage Temperature	-55/+150	°C
$P_{PK}$	Peak Pulse Power (8/20 $\mu s$ )	50	W

### Electrical Characteristics (T = 25°C)

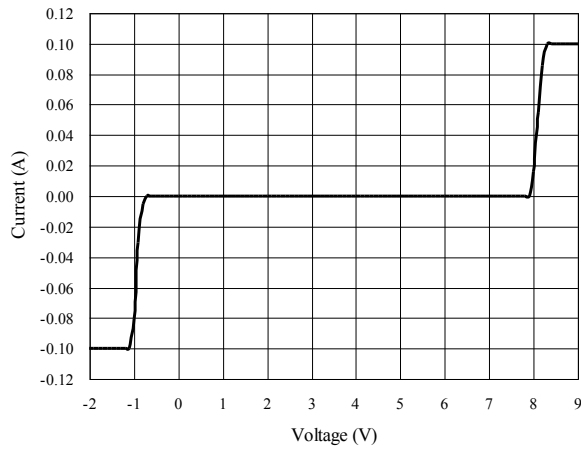
Symbol	Parameter
$V_{RWM}$	Nominal Reverse Working Voltage
$I_R$	Reverse Leakage Current @ $V_{RWM}$
$V_{BR}$	Reverse Breakdown Voltage @ $I_T$
$I_T$	Test Current for Reverse Breakdown
$V_C$	Clamping Voltage @ $I_{PP}$
$I_{PP}$	Maximum Peak Pulse Current
$C_{ESD}$	Parasitic Capacitance
$V_R$	Reverse Voltage
f	Small Signal Frequency
$I_F$	Forward Current
$V_F$	Forward Voltage @ $I_F$



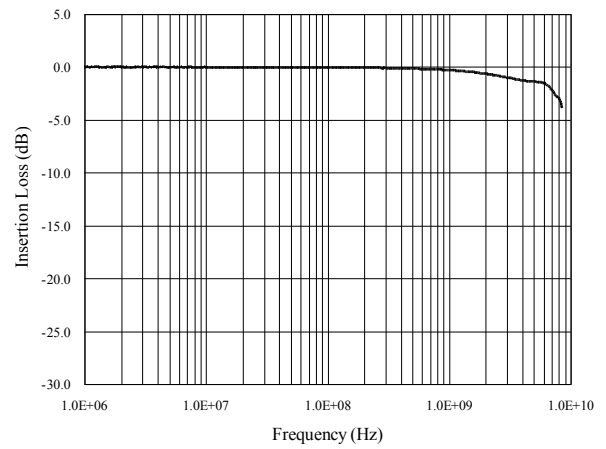
Symbol	Test Condition	Minimum	Typical	Maximum	Units
$V_{RWM}$				3.3	V
$I_R$	$V_{RWM} = 3.3V, T = 25^\circ C$ Between I/O and GND		0.1	1.0	$\mu A$
$V_{BR}$	$I_T = 1mA$ Between I/O and GND	6.0		8.0	V
$V_C$	$I_{PP} = 1A, t_p = 8/20\mu s$ Between I/O and GND			10.0	V
$V_C$	$I_{PP} = 5A, t_p = 8/20\mu s$ Between I/O and GND		10.0	12.0	V
$C_{ESD}$	$V_R = 0V, f = 1MHz$ Between I/O and GND		0.5	0.8	pF



### Voltage Sweeping of I/O to GND

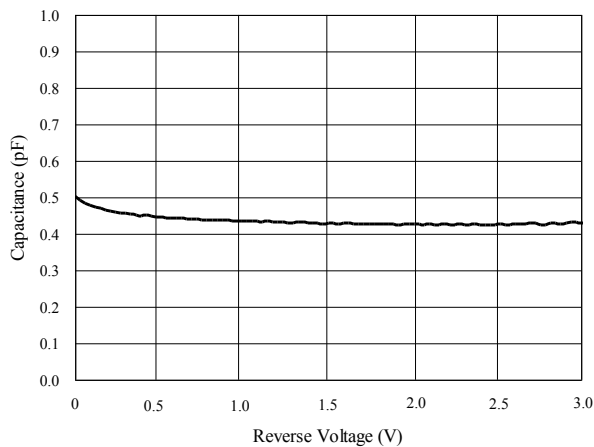


### Insertion Loss S21 of I/O to GND

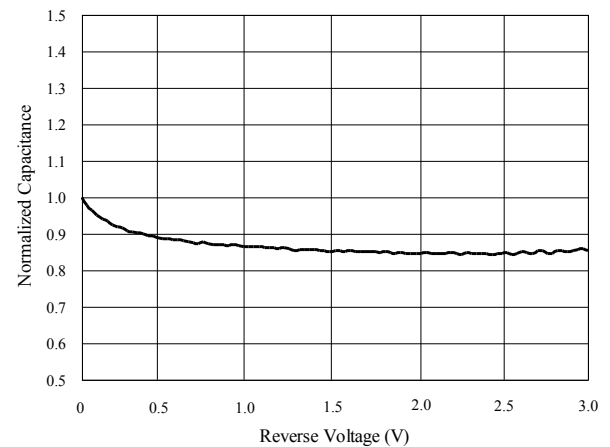


### Capacitance vs. Voltage of I/O to GND (f = 1MHz)

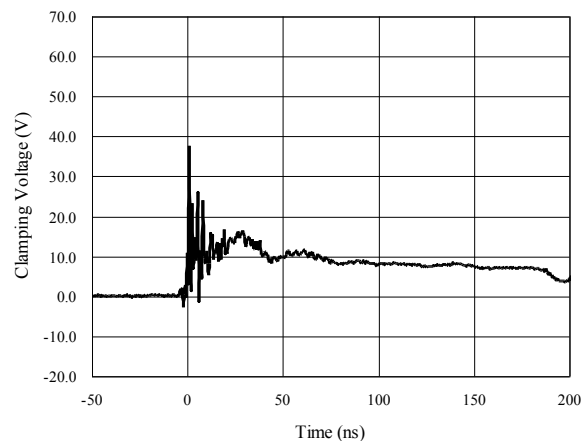
Capacitance vs. Reverse Voltage



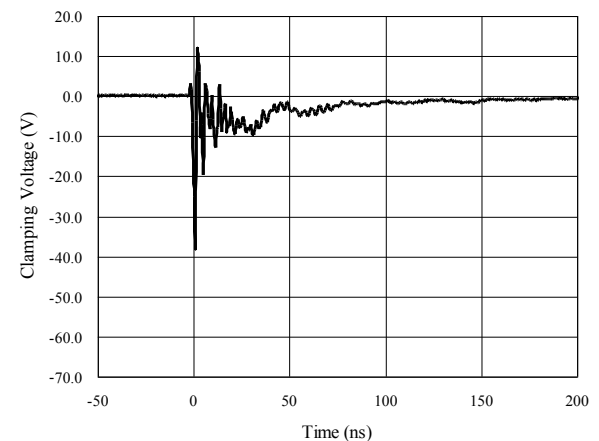
Normalized Capacitance vs. Reverse Voltage



### ESD Clamping of I/O to GND (+8kV Contact per IEC 61000-4-2)



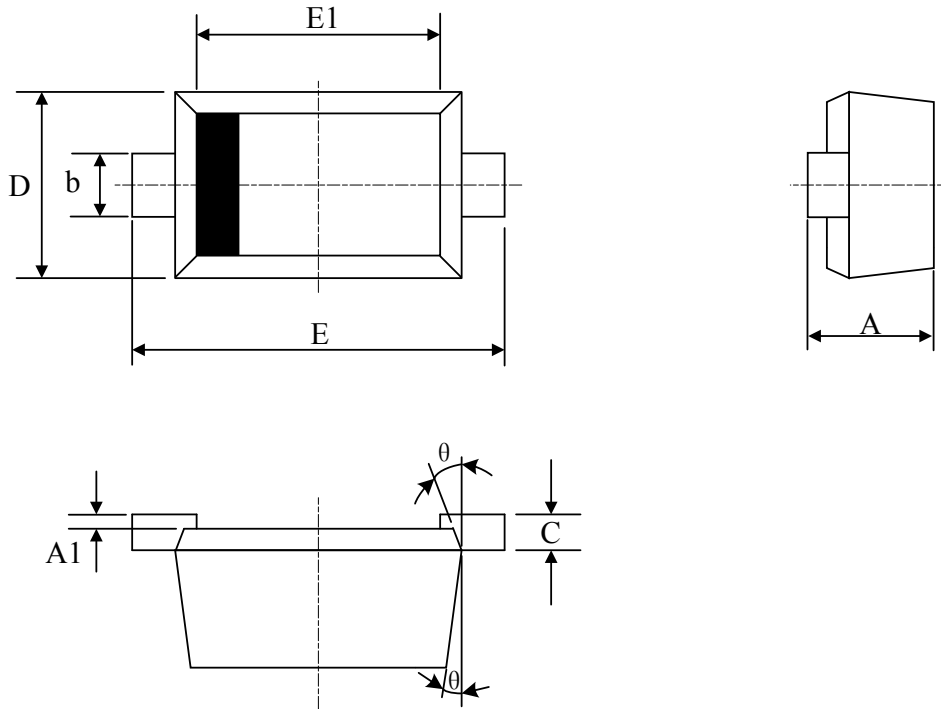
### ESD Clamping of I/O to GND (-8kV Contact per IEC 61000-4-2)





### Package Outline

- ❑ SOD-923 package
- ❑ 2 leads, very small package
- ❑ MSL-1

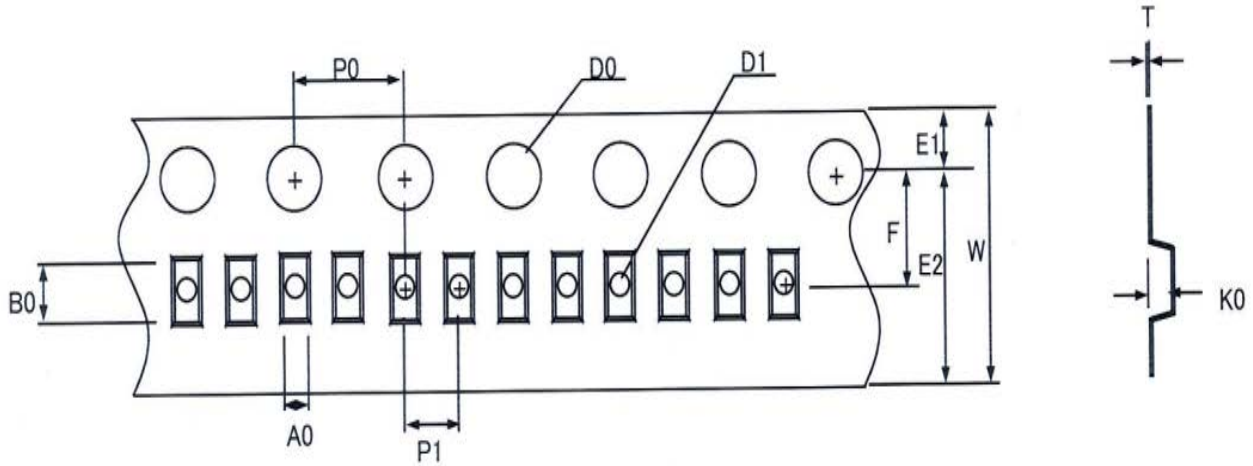


Package Dimensions (Controlling dimensions are in millimeters)

Symbol	Dimensions (mm)		Dimensions (Inches)	
	Minimum	Maximum	Minimum	Maximum
A	0.350	0.430	0.014	0.017
A1	0.000	0.050	0.000	0.002
b	0.170	0.270	0.007	0.011
C		0.150		0.006
D	0.550	0.650	0.022	0.026
E	0.900	1.100	0.035	0.043
E1	0.750	0.850	0.030	0.033
θ	7° REF.		7° REF.	

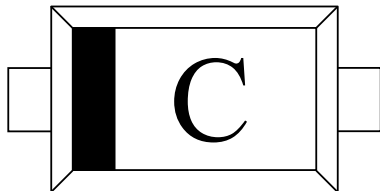


### Tape and Reel Specification



ITEM	Dimensions (mm)
A0	0.67 +/- 0.05
B0	1.12 +/- 0.05
W	8.0 +/- 0.2
D0	1.55 +/- 0.05
D1	0.50 +/- 0.05
E1	1.75 +/- 0.10
E2	6.25 MIN
F	3.50 +/- 0.10
P0	4.0 +/- 0.05
P1	2.0 +/- 0.05
K0	0.52 +/- 0.05 *1
T	0.20 +/- 0.020

### Marking Codes



### Ordering Information

Part Number	Working Voltage	Quantity Per Reel	Reel Size
TT0311TCX	3.3V	10,000	7 Inch

#### Note:

(1) "C" is part number, fixed .

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